

EUDRILIN EARTHWORMS, INCLUDING A NEW GENUS,
FROM EASTERN NIGERIA

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As only two species of eudrilid (subfamily Eudrilinae) earthworms have previously been described and two others recorded from the eastern region of Nigeria, collections were made from Imo, Anambra and Cross River States (three of the four states constituting the old eastern region of Nigeria). Michaelsen (1913) recorded *Eudrilus eugeniae* from Old Calabar and Segun (1976) described a new genus and species, *Agrotoreutus nyongii* from Nsukka. Segun (In press) also described a new species, *Iridodrilus tonyii* from Oron and Ekwagbe near Nsukka, and recorded *I. roseus* from Oron.

Earthworms were collected from gardens and cultivated land by digging and hand sorting during the rains of July, August and September, 1976. In the material collected, nine species of eudrilin earthworms including a species new to science were identified. The new species exhibits a combination of characters which necessitates the erection of a new genus. This paper contains a description of the new genus and species, and records of eight other species belonging to six genera, *Agrotoreutus*, *Ephyriodrilus*, *Eudrilus*, *Hyperiodrilus*, *Iridodrilus* and *Keffia*.

1. *Agrotoreutus nyongii* Segun, 1976

Agrotoreutus nyongii Segun, 1976:389-393. Type-locality, Nsukka, Anambra State.

Material.—Botanical and Zoological Gardens, University of Nigeria, Nsukka, June and July 1976; 30 clitellate, 25 aclitellate specimens.

2. *Ephyriodrilus afroccidentalis* Sims, 1971

Ephyriodrilus afroccidentalis Sims, 1971:533-536. Type-locality, Ibadan, Nigeria.

Material.—Botanical Gardens, University of Nigeria, Nsukka, June 1976; 3 clitellate specimens. Farmland near market place, Umuagwo, Imo State, August 1976; 40 clitellate and 3 aclitellate specimens. Edge of cassava plantation, Abachcbe, Egbema, Imo State, August, 1976; 1 clitellate specimen. Farmland, Calabar, Cross River State, September 1976; 1 clitellate specimen.

Remarks.—The present series matches the description of this species, but one of the specimens collected from Umuagwo has its porophore on

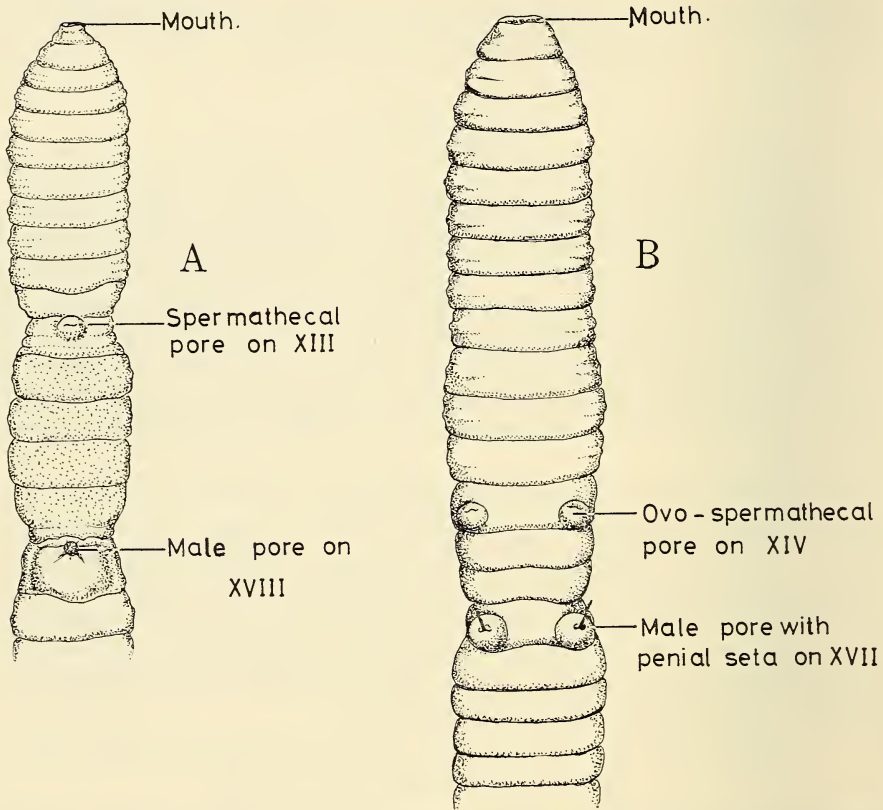


Fig. 1. A, *Hyperiodrilus euryaulos*, external features, ventral view; B, *Nsukkadrilus mbae*, external features, ventral view.

segment XVII. This results in the extreme shortness of the seminal groove linking it with the male pore.

3. *Eudrilus eugeniae* (Kinberg, 1866)

Lumbricus eugeniae Kinberg, 1866:98. Type-locality, St. Helena.

Material.—Botanical Gardens and Green House, University of Nigeria, Nsukka, June and July 1976; 10 clitellate and 6 acitellate specimens. Farmland, Calabar, Cross River State, September 1976; 9 clitellate and 5 acitellate specimens.

4. *Hyperiodrilus africanus* Beddard, 1891

Hyperiodrilus africanus Beddard, 1891:236. Type-locality, Lagos, Nigeria.

Material.—Botanical and Zoological Gardens, University of Nigeria, Nsukka, June and July 1976; 12 clitellate specimens. Edge of cassava plantation, Abachebe, Egbema, Imo State, August 1976; 2 clitellate specimens. Farmland, Ula-Ehudia on Ahoada-Omoku road, Imo State, August 1976; 2 clitellate specimens.

5. *Hyperiodrilus euryaulos* Clausen, 1967

Figure 1A

Hyperiodrilus euryaulos Clausen, 1967:186–189. Type-locality, Guinea savanna, Togo.

Material.—Edge of cassava plantation, Abachebe, Egbema, Imo State, August 1976; 3 clitellate specimens.

Remarks.—Members of the series from Egbema match the description of this species which had previously been reported from Warri, Nigeria. The external diagnostic features are shown in Fig. 1A.

6. *Iridodrilus tonyii* Segun (In press)

Iridodrilus tonyii Segun, In press. Type-locality, Oron and Ekwagbe, Nigeria.

Material.—Farmland near market place, Umuagwo, near Elele, Imo State, August 1976; 1 clitellate specimen. Farmland, Calabar, Cross River State, September 1976; 19 clitellate and 1 a clitellate specimens.

7. *Iridodrilus vomiensis* Segun (In press)

Iridodrilus vomiensis Segun, In press. Type-locality, Vom and Jos, Benue Plateau State, Nigeria.

Material.—Farmland, Ula-Ehudia on Ahoada-Omoku road, Imo State, August 1976; 31 clitellate and 3 a clitellate specimens. Edge of cassava plantation, Abachebe, Egbema, Imo State, August 1976; 9 clitellate and 1 a clitellate specimens.

8. *Keffia nigeriensis* Clausen, 1963

Keffia nigeriensis Clausen, 1963:311–315. Type-locality, Vom, Benue Plateau State, Nigeria.

Material.—Botanical and Zoological Gardens, University of Nigeria, Nsukka, Anambra State, June and July 1976; 28 clitellate and 10 a clitellate specimens.

9. *Nsukkadrilus*, new genus

Definition.—Eudrilinae with ventral setae fairly widely, and lateral setae more closely paired. Penial setae present. Dorsal pores absent. Male pores paired on raised papillae on segment XVII; ovo-spermathecal pores paired on XIV. Six intestinal gizzards present in segments XX–XXV, esophageal gizzards and suprainstestinal glands absent. Unpaired, ventral esophageal sacs present in segments X and XI, paired dorsolateral esophageal glands in segment XII. Holandric, testes enclosed in paired testis sacs. Ovaries paired and enclosed in ovarian sacs in segment XIII, each ovary leading by a narrow ovarian duct into lateral wall of receptaculum seminis. Spermathecal atria paired, left and right parts completely separate. Oviduct leads into spermatheca with no opening of its own.

Distribution.—Nsukka, Anambra State, Eastern Nigeria.

Type-species.—*Nsukkadrilus mbae*, new species.

Remarks.—The genus has affinities with *Malodrilus*–*Eudrilus*–*Hippopera* group. It resembles these genera in the fusion of the female and spermathecal pores. The fused ovo-spermathecal openings are paired and they are found anterior to the male pores in all these genera. The morphology of the spermathecal system and its relationship with the female system of this new genus is similar to that of *Eudrilus*. The morphology of the gut differs in both genera and penial setae are only present in *Nsukkadrilus*. Although in both *Eudrilus* and *Nsukkadrilus* paired dorsolateral esophageal glands are present in segment XII and unpaired ventral esophageal sacs occur in X and XI, the former genus has an esophageal gizzard while in the latter only intestinal gizzards are present. Both *Malodrilus* and *Hippopera* with esophageal gizzards also lack intestinal gizzards.

Nsukkadrilus resembles *Hyperiodrilus*, *Iridodrilus* and *Heliodrilus* in possessing intestinal gizzards, but both female and spermathecal openings are separate in these genera. Of these genera, only *Hippopera* possesses paired prostatic pores.

Etymology.—*Nsukkadrilus* is named after the University town of Nsukka in Anambra State, Nigeria from where the specimens were collected.

Nsukkadrilus mbae, new species

Fig. 1B, 2

Material.—One of the four clitellate specimens collected from Botanical and Zoological Gardens, University of Nigeria, Nsukka is now kept in the British Museum (Natural History), Reg. No. 1976. 24.1 as the holotype. One of the three paratypes is also kept in the British Museum (Natural History), Reg. No. 1976.24.2 and the other two in the Natural History Museum, University of Ife, Ile-Ife, Nigeria, Reg. No. 1976.1.1–2.

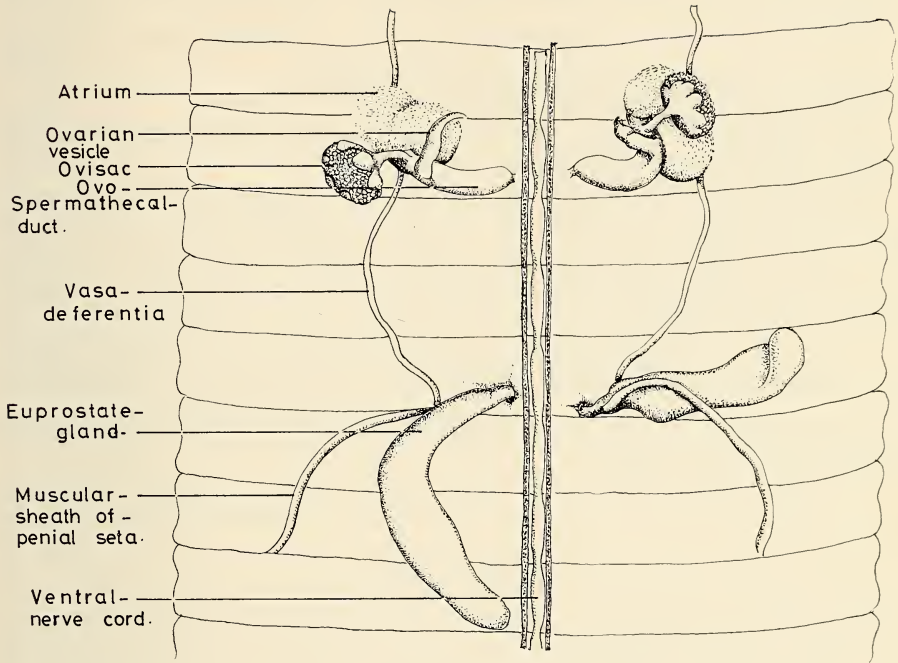


Fig. 2. *Nsukkadrilus mbae*, Ovo-spermathecal and male (part) systems.

External Characters.—The earthworms measure from 80 to 105 mm in length and from 3 to 3.5 mm in diameter in the clitellar region which is the widest region. The number of segments varies from 148 to 260, the clitellar segments are widest and the postclitellar ones from segment XVIII or XIX backwards are antero-posteriorly narrower than the other segments. The middle part of each of the preclitellar segments is raised and the setae of these segments are situated on the raised parts. The body is unpigmented and the color of the preserved specimens is dull gray with yellowish clitellum. The prostomium is epilobous, almost tanylobous. The clitellum, on segments XIII to XVII, is saddle-shaped stopping at level of seta *d* and thereby occupying *dd*. Dorsal pores are absent.

The setae have a eudrilin arrangement with $ab > cd$; the setal formula ($AA:AB:BC:CD$) at segment XX = 8:6:8:3 and at segment XXX = 13:5:4:1. $dd = \frac{1}{2}$ circumference.

The male pores are paired on the apices of 2 protuberances between 2 *a* setae on segment XVII, both protuberances being joined by a slender

bridge (Fig. 2). Penial setae are sometimes seen protruding from the male pores.

The ovo-spermathecal pores with tumid lips are slightly more closely paired than the male pores on segment XIV (Fig. 2).

Genital papillae and markings are lacking.

The nephridiopores are paired in the posterior wall of each furrow within setal lines *cd*, equidistant from *c* and *d*.

Internal characters.—First septum 4/5 is thin. Septa 5/6 to 7/8 are conical and muscular; 8/9 to 10/11 are also muscular while 11/12 is thin. The buccal cavity opens into a muscular pharynx extending to septum 4/5. The esophagus extends from segment V to segment XV. It is undifferentiated throughout except for the unpaired, midventral sacs in X and XI, and the paired dorsolateral glands in XII. These paired glands are closely applied to 12/13 septum. The intestine begins in XVI and there are gizzards in XX–XXV. Esophageal gizzard, suprainstestinal glands and typhlosole are absent.

The dorsal blood vessel runs anteriorly to segment V where it breaks up into tiny vessels to supply the pharyngeal region. It gives off subsidiary vessels to serve the unpaired median esophageal sacs in segments X and XI. In segment XII, a large pair of vessels is given off from the dorsal vessel to serve the paired glands. This pair joins below the esophagus, separates and later joins to run posteriorly on the left side of the ventral nerve cord giving off branches to the ovo-spermathecal apparatus. It later becomes the subneural vessel in segment XX. Another large pair of vessels is given off in segment XIII and these run forwards to serve the paired esophageal glands. Prominent, paired septal vessels occur in 11/12 to 16/17 septa, and 2 pairs of parietal vessels are found in each intestinal segment. A supraesophageal vessel runs on the gut in segments IX to XI. Five pairs of commissural blood vessels connect the dorsal and the supraesophageal blood vessels with the ventral vessels in segments VII to XI.

Each testis, in segment X and XI, is enclosed in a bean-shaped, white iridescent sac which lies near to the posterior septum of each segment. The vasa deferentia come together in segment XII and continue posteriorly to segment XVIII where they enter into the ental (anterior) region of the euprostate. Vesiculae seminales are paired in segments XI and XII, the anterior pair extending to segment XV or XVI and posterior pair to XVI or XVII. These vesicles appear to be deeply incised. The euprostates are paired, whitish, muscular, cylindrical sometimes slightly curved bodies occupying segments XVII to XX on both sides of the esophagus. A long, narrow strip of muscular sheath is attached to the bodywall near

19/20 (Fig. 2). It then runs underneath the prostatic gland and finally terminates at the male pore. This sheath contains a penial seta which is of the rolled type and which is often found protruding through the prostatic pore.

Each ovary is enclosed within an ovarian vesicle from which an ovarian duct passes posteriorly into segment XIV to enter into the wider oospermathecal duct. An ovisac, with a calyx-leaflike appearance at its base, leads into the fertilization chamber which opens, in turn, into the oospermathecal duct through a narrow, whitish, muscular stalklike duct (Fig. 2). The spermathecal atrium is less muscular, balloon-shaped and septate. It also opens into the ovo-spermathecal duct which runs inward to open ventrally on either side of the ventral nerve cord and blood vessels through an ovo-spermathecal pore on segment XIV.

Nephridia are present from segment IV. The nephridial reservoirs are comparatively larger in the clitellar region.

Etymology.—This earthworm is named after Dr. (Miss) C. C. Mba, Soil Science Department, University of Nigeria, Nsukka, who sent me four preserved specimens.

Acknowledgments

I wish to express my gratitude to both Dr. (Miss) C. C. Mba of the University of Nigeria, Nsukka and Miss Inyang Etcheri of the University of Ife, Nigeria, for presenting some preserved earthworms from Nsukka and Calabar respectively. My thanks are also due to Joan Bacon for preparing the figures.

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